AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior versions, and listings of claims in the application:

Claims 1-46. (Cancelled).

47. (Previously presented) A system for providing a flow of gas to a patient comprising:

a pressure generating system adapted to provide a flow of gas responsive to a control signal;

a patient circuit having a first end coupled to the pressure generating system and adapted to communicate the flow of gas with an airway of a patient;

a flow sensor adapted to measure the flow of gas in the patient circuit and to output a first flow signal indicative thereof;

a pressure sensor adapted to measure a pressure of the flow of gas in the patient circuit and to output a first pressure signal indicative thereof;

an exhaust assembly adapted to communicate gas from within the patient circuit to ambient atmosphere; and

a controller that receives the first flow signal and the first pressure signal and outputs the control signal that controls the flow of gas delivered to the patient circuit by the pressure generating system and, hence, the flow of gas at a patient's airway, wherein the controller detects onset of an inspiratory phase of a patient's breathing cycle for triggering an inspiratory flow of gas based on such a patient's inspiratory effort, which is determined based on both a flow related parameter determined from the first flow signal and a pressure related parameter determined from the first pressure signal.

48. (Previously presented) The system according to claim 47, wherein the pressure generating system includes:

a blower that receives a supply of gas from a gas source and provides the flow of gas;

a flow controller associated with the blower to control a rate of the flow of gas responsive to the control signal.

49. (Previously presented) The system according to claim 47, wherein the flow sensor is disposed in the first end of the patient circuit.

50. (Previously presented) The system according to claim 47, wherein the patient circuit is a two-limb circuit.

51. (Previously presented) The system according to claim 47, wherein the exhaust assembly includes an exhaust flow controller to control a rate of the exhaust flow of gas from the patient circuit responsive to an exhaust flow control signal provided by the controller.

52. (Previously presented) The system according to claim 47, further comprising a secondary gas flow system that delivers a secondary flow of gas to the patient circuit, wherein the secondary gas flow system includes:

a conduit configured and arranged so as to communicate the secondary flow of gas from a source of the secondary flow of gas to the patient circuit; and

a second flow sensor adapted to measure the secondary flow of gas in the conduit and to output a second flow signal indicative thereof.

53. (Previously presented) The system according to claim 47, wherein the controller establishes a trigger lockout interval, which is a period of time during each expiratory

phase of a breathing cycle in which triggering the inspiratory flow of gas is prevented, based on at least one of the first flow signal and the first pressure signal.

54. (Previously presented) The system according to claim 47, wherein the controller:

determines a patient flow difference ($Q_{patient}$- Q_{ref}) as the flow related parameter, where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a trigger window, which is a period of time during which triggering the inspiratory flow of gas is permitted;

determines a patient pressure difference(P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the trigger window;

determines the patient's inspiratory effort as a product of the patient flow difference and the patient pressure difference; and

triggers the inspiratory flow of gas responsive to the patient's inspiratory effort exceeding a threshold.

55. (Previously presented) The system according to claim 47, wherein the controller:

determines a patient flow difference ($Q_{patient}$- Q_{ref}) as the flow related parameter, where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a trigger window, which is a period of time during which triggering the inspiratory flow of gas is permitted;

determines a patient pressure difference (P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the trigger window;

determines the patient's inspiratory effort as a product of the patient flow difference and the patient pressure difference;

sums the patient's inspiratory efforts accumulated over a time interval; and

triggers the inspiratory flow of gas responsive to the sum of the patient's inspiratory efforts over the time interval exceeding a threshold.

56. (Previously presented) The system according to claim 47, wherein the controller:

determines a patient pressure difference (P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at a start of a trigger window;

delays the patient pressure difference in time to determine a delayed patient pressure difference;

determining a current patient flow from the first flow signal as the flow related parameter;

determines a product of a current patient flow and the delayed patient pressure difference as the patient's inspiratory effort;

sums the patient's inspiratory efforts accumulated over a time interval; and

triggers the inspiratory flow of gas responsive to the sum of the patient's inspiratory effort exceeding a threshold.

57. (Previously presented) The system according to claim 47, wherein the controller detects onset of an expiratory phase of a patient's breathing cycle for cycling from providing the inspiratory flow of gas to allowing an expiratory flow of gas from the exhaust assembly based on such a patient's expiratory effort, which is determined based on both the first flow signal and the first pressure signal.

58. (Previously presented) The system according to claim 57, wherein the controller:

determines a patient flow difference (Q_{ref} - $Q_{patient}$), where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

determines a patient pressure difference ($P_{patient}$ - P_{ref}), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the cycling window;

determines the patient's expiratory effort as a product of the patient flow difference and the patient pressure difference; and

cycles from providing the inspiratory flow of gas to allowing an expiratory flow of gas from the exhaust assembly responsive to the patient's expiratory effort exceeding a threshold.

59. (Previously presented) The system according to claim 57, wherein the controller:

determines a patient pressure difference ($P_{patient}$ - $P_{ref,}$), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

delays a patient flow from the first flow signal to determine a delayed patient flow;

determines a product of the patient pressure difference and the delayed patient flow as the patient's expiratory effort;

sums the patient's expiratory efforts accumulated over a time interval; and

cycles from providing the inspiratory flow of gas to allowing an expiratory flow of gas from the exhaust assembly responsive to the sum of the patient's expiratory effort exceeding a threshold.

60. (Previously presented) The system according to claim 57, wherein the controller:

determines a patient flow difference (Q_{ref}- $Q_{patient}$), where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

determines a patient pressure difference ($P_{patient}$ - P_{ref}), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the cycling window;

determines the patient's expiratory effort as a product of the patient flow difference and the patient pressure difference;

sums the patient's expiratory efforts accumulated over a time interval; and

cycles from providing the inspiratory flow of gas to allowing an expiratory flow of gas from the exhaust assembly responsive to the sum of the patient's expiratory efforts over the time interval exceeding a threshold.

61. (Previously presented) The system according to claim 47, wherein the controller cycles from providing the inspiratory flow of gas to allowing an expiratory flow of gas from the exhaust assembly by comparing patient flow determined from the first flow signal against a cycle threshold flow and cycles responsive to the patient flow falling below the cycle threshold flow.

62. (Previously presented) The system according to claim 61, wherein the controller:

monitors patient pressure, via the first pressure signal, at an end portion of an inspiratory phase and monitors patient flow, via the first flow signal, at a beginning portion of an expiratory phase to determine whether the system cycled too early or too late; and

adjusts the cycle threshold flow for a next breathing cycle responsive to a determination that the system cycled too early or too late.

63. (Previously presented) A method of providing a flow of gas to a patient comprising:

generating a flow of gas;

providing the flow of gas to a patient via a patient circuit;

controlling the flow of gas delivered to a patient responsive to a control signal;

measuring the flow of gas in the patient circuit and outputting a first flow signal indicative thereof;

measuring a pressure of the flow of gas in the patient circuit and outputting a first pressure signal indicative thereof;

communicating gas from within the patient circuit to ambient atmosphere; and

detecting onset of an inspiratory phase of a patient's breathing cycle for triggering an inspiratory flow of gas based on such a patient's inspiratory effort, which is determined based on both a flow related parameter determined from the first flow signal and a pressure related parameter determined from the first pressure signal.

64. (Previously presented) The method according to claim 63, wherein detecting the onset of the inspiratory phase includes:

determining a patient flow difference ($Q_{patient}$- Q_{ref}) as the flow related parameter, where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a trigger window, which is a period of time during which the expiratory flow of gas is permitted;

determining a patient pressure difference (P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the trigger window; and

determining the patient's inspiratory effort as a product of the patient flow difference and the pressure difference.

65. (Previously presented) The method according to claim 64, further comprising triggering an inspiratory flow of gas responsive to the patient's inspiratory effort exceeding a threshold.

66. (Previously presented) The method according to claim 63, wherein detecting the onset of the inspiratory phase includes:

determining a patient flow difference ($Q_{patient}$- Q_{ref}) as the flow related parameter, where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a trigger window, which is a period of time during which the expiratory flow of gas is permitted;

determining a patient pressure difference (P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at a start of a trigger window;

determining the patient's inspiratory effort as a product of a patient flow difference and the pressure difference;

summing the patient's inspiratory efforts accumulated over a time interval; and

triggering an inspiratory flow of gas responsive to the sum of the patient's inspiratory efforts over the time interval exceeding a threshold.

67. (Previously presented) The method according to claim 63, wherein detecting the onset of the inspiratory phase includes:

determining a patient pressure difference (P_{ref} - $P_{patient}$) as the pressure related parameter, where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at a start of a trigger window, which is a period of time during which the expiratory flow of gas is permitted;

determining a delayed patient pressure difference, where a length of the delay is selected so as to account for an inherent physiological delay between an onset of a pressure drop and a rise in patient flow occurring at a beginning of inspiration;

determining a current patient flow from the first flow signal as the flow related parameter;

determining a product of the current patient flow and the delayed patient pressure difference as the patient's inspiratory effort;

summing the patient's inspiratory efforts accumulated over a time interval; and

triggering an inspiratory flow of gas responsive to the sum of the patient's inspiratory effort exceeding a threshold.

68. (Previously presented) The method according to claim 63, further comprising detecting onset of an expiratory phase of a patient's breathing cycle for cycling from providing an inspiratory flow of gas to allowing an expiratory flow of gas from the patient circuit based on such a patient's expiratory effort, wherein detecting the onset of an expiratory phase is determined based on both the first flow signal and the first pressure signal.

69. (Previously presented) The method according to claim 68, wherein detecting an onset of an expiratory phase includes:

determining a patient flow difference (Q_{ref} - $Q_{patient}$), where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

determining a patient pressure difference ($P_{patient}$ - P_{ref}), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the cycling window;

determining the patient's expiratory effort as a product of the patient flow difference and the patient pressure difference; and

cycling from providing an inspiratory flow of gas to allowing an expiratory flow of gas from the patient circuit responsive to the patient's expiratory effort exceeding a threshold.

70. (Previously presented) The method according to claim 68, wherein detecting an onset of an expiratory phase includes:

determining a patient pressure difference ($P_{patient}$ - $P_{ref,}$), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

delaying a patient flow from the first flow signal to determine a delayed patient flow;

determining a product of the patient pressure difference and the delayed patient flow as the patient's expiratory effort;

summing the patient's expiratory efforts accumulated over a time interval; and

cycling from providing an inspiratory flow of gas to allowing an expiratory flow of gas from the patient circuit responsive to the sum of the patient's expiratory effort exceeding a threshold.

71. (Previously presented) The method according to claim 68, wherein detecting an onset of an expiratory phase includes:

determining a patient flow difference (Q_{ref} - $Q_{patient}$), where $Q_{patient}$ is a current patient flow from the first flow signal and Q_{ref} is a reference patient flow determined from the first flow signal at a start of a cycling window, which is a period of time during which the expiratory flow of gas from the patient circuit is permitted;

determining a patient pressure difference ($P_{patient}$ - $P_{ref,}$), where $P_{patient}$ is a current patient pressure from the first pressure signal and P_{ref} is a reference patient pressure determined from the first pressure signal at the start of the cycling window;

determining the patient's expiratory effort as a product of the patient flow difference and the patient pressure difference;

summing the patient's expiratory efforts accumulated over a time interval; and

cycling from providing an inspiratory flow of gas to allowing an expiratory flow of gas from the patient circuit responsive to the sum of the patient's expiratory efforts over the time interval exceeding a threshold.

72. (Previously presented) The method according to claim 63, wherein the controller cycles from providing an inspiratory flow of gas to allowing an expiratory flow of gas from the patient circuit by comparing patient flow determined from the first flow signal against a cycle threshold flow and cycles responsive to the patient flow falling below the cycle threshold flow.

73. (Previously presented) The method according to claim 72, further comprising:

monitoring patient pressure, via the first pressure signal, at an end portion of an inspiratory phase;

monitoring patient flow, via the first flow signal, at a beginning portion of an expiratory phase;

determining whether cycling occurred too late based on the patient pressure at the end portion of the inspiratory phase;

determining whether cycling occurred too early based on the patient flow at the beginning portion of the expiratory phase; and

adjusting the cycle threshold flow for a next breathing cycle responsive to a determination that cycling occurred too early or too late.